# Writing and Editing Technical Documents

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# Acknowledgement

I have been an editor for over 25 years. During that time, I have worked with authors from around the world and edited and produced journals, books, and conference proceedings. I have also developed projects to improve science writing and editing in the Third World.

One of these projects was based at the International Rice Research Institute in the Philippines. Out of this project grew *Editing and Publication: A Training Manual* by Ian Montagnes.

Ian's excellent guide is the basis for much of the material in this training program. Examples have been changed and the emphasis has sometimes been altered, but much of the work is Ian's. I owe much to Ian for his painstaking work as project leader and for writing such a complete treatment of editing and publishing.

I also benefitted from the guidance and inspiration given to me many years ago by Reg MacIntyre. He had faith in me, taught me all he knew about editing and publication production, gave me confidence, and provided opportunities for personal growth and development.

I am indebted to both Reg and Ian for their direct and indirect contributions. I hope their faith and previous effort help me make this a worthwhile training program for you.

We will discuss ways to improve your writing and editing skills, work on examples together, and review samples of your own writing.

# Planning a Publication

*Who? Where? What? Why? When?* and *How?* These six questions are powerful tools for analyzing almost any problem.

They will help you plan to write a new publication. Asking and answering these six questions can also suggest ways to improve existing manuals and reports.

The first five questions should be answered before you decide *how* a manuscript can best be written and published.

## Who has the material been written for?

- ☐ Scientists?
- ☐ Technicians?
- ☐ Extension workers?
- ☐ Engineers?
- ☐ Donors?
- ☐ Policymakers?
- ☐ Institutional staff?
- ☐ Visitors?

This is the most important single question because so many writing and editorial decisions follow from the answer.

In this project, it may be quite straightforward to identify the *audience* for a manual. For an installation manual, it would likely be a technician.

However, sometimes authors decide they want to reach two or three different kinds of readers. The answer to Who? may be "This was written for electrical engineers with university

## Exercise 1

On the following pages, are four extracts from books. manuals, and brochures that discuss different aspects of computers. For each of the samples, please answer these questions:

- ☐ **Who** was the material written for? (imagine a typical reader)
- ☐ **What** clues helped you to identify the intended reader?
- ☐ **When** is the material going to be used?
- ☐ **Where** will the publication be used?
- ☐ **Why** was the material written?
- ☐ Describe **how** the publication was planned to meet these intentions. Can you suggest any ways the publications might have been changed to meet these intentions more effectively?

Write your answers on the page opposite the sample.

**Who?**

**What?**

**When?**

**Where?**

**Why?**

**How?**

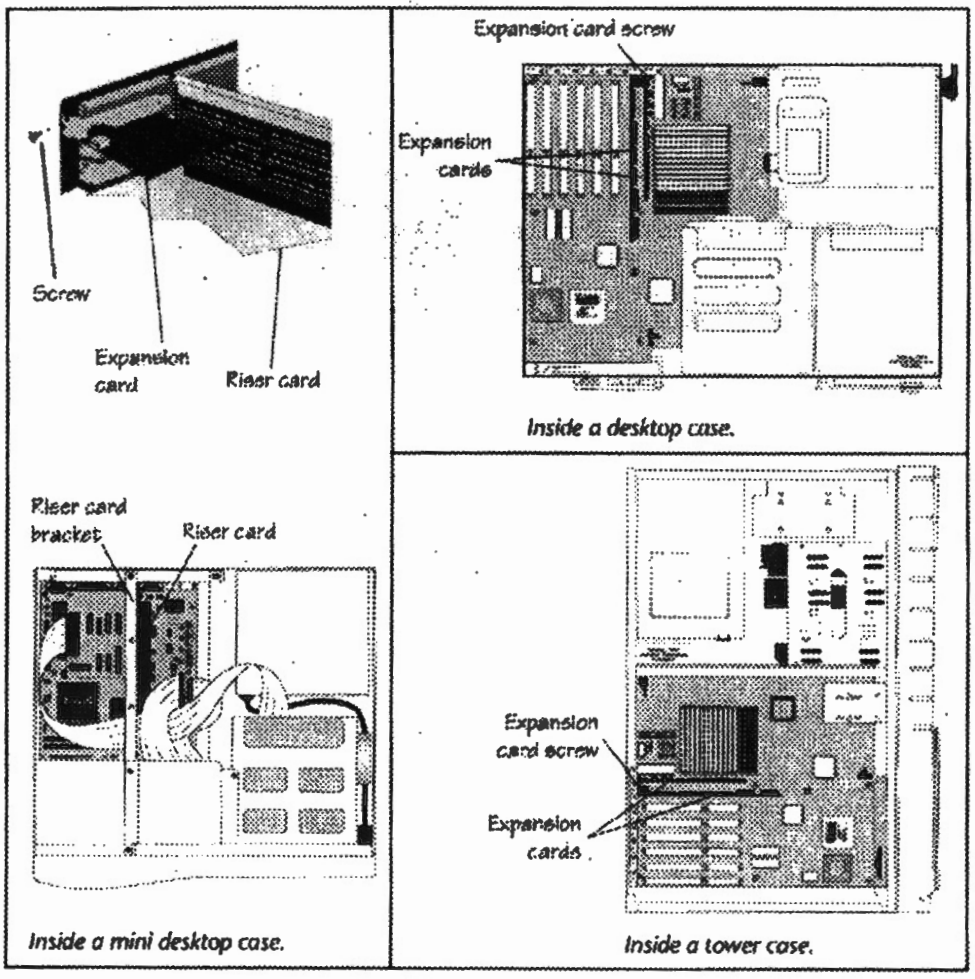
## Replacing expansion cards

*Typical expansion card.*

Expansion cards connect into the slots on the system board, and provide the ports (COM1, LPT1 and so forth) on the back of the system.

**To replace expansion cards:**

1. Open the case. Then remove the screw that secures the expansion card to the case.



**Who?**

**What?**

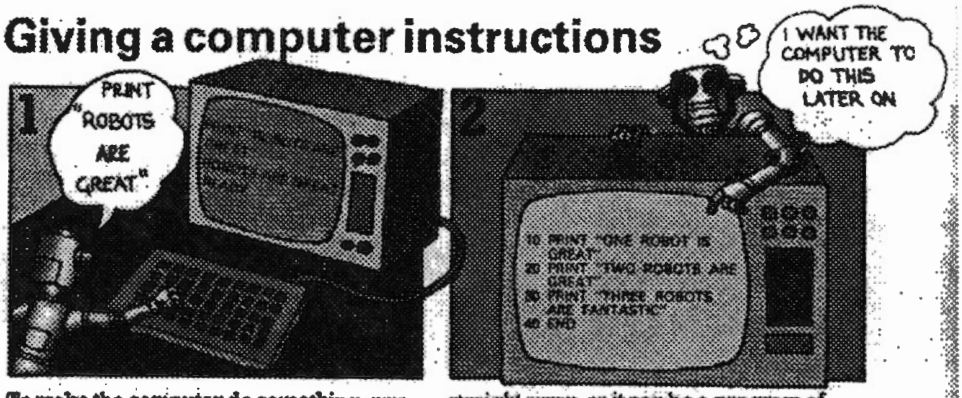
**When?**

**Where?**

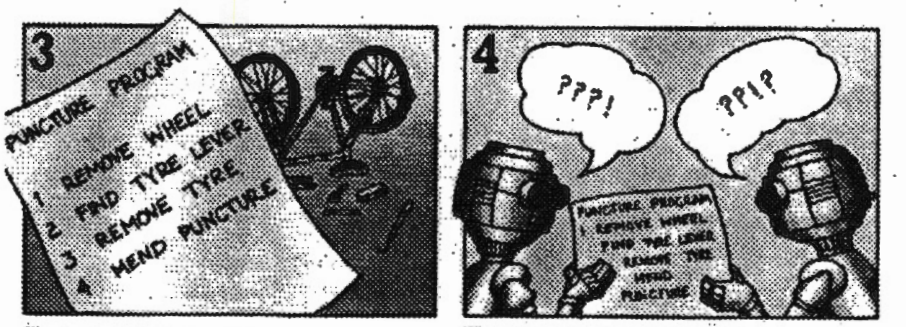
**Why?**

**How?**

# Giving a computer instructions




To make the computer do something, you have to type in an instruction it understands. This instruction can be a direct command which it carries out straight away, or it can be a program of instructions which it stores in its memory and does not carry out until you give it the go-ahead.




The instructions in a program have to be very carefully worked out. The computer will attempt to carry out your instructions precisely, even if they are wrong.




The computer cannot understand instructions written in our language, so you have to write them in one of the many computer languages. Some of these languages are described opposite.


All the work inside the computer is done with a code of tiny pulses of electricity. Your instructions are translated into computer code by a special program inside the computer called the interpreter.


Each piece of information in computer code is represented by patterns of pulses. Computer code can be written down using 1 to represent a pulse and 0 to show there is no pulse.

**Who?**

**What?**

**When?**

**Where?**

**Why?**

**How?**

Table 7.3 shows the minimum and maximum value you can store in variables of each floating-point type. The values listed in this table apply only to normalized floating-point numbers; denormalized floating-point numbers have a smaller minimum value. Note that numbers retained in 80x87 registers are always represented in 80-bit normal form; numbers can only be represented in denormal form when stored in 32- or 64-bit floating-point variables (type **float** and type **long**).

**Table 7.3 Range of Floating-Point Types**

| Type | Minimum Value | Maximum Value |
|---|---|---|
| **float** | 1.175494351 E – 38 | 3.402823466 E + 38 |
| **double** | 2.2250738585072014 E – 308 | 1.7976931348623158 E + 308 |
| **long double** | 3.36210314311209350 3 E – 4932 | 1.189731495357231765 E + 4932 |

If precision is less of a concern than storage, consider using type **float** for floating-point variables. Conversely, if precision is the most important criterion, use type **long double**.

**Microsoft C/C++ observes type-widening rules.**

Floating-point variables can be promoted to a type of greater significance (for example, from type **float** to type **double**). Promotion often occurs when you perform arithmetic on floating-point variables. This arithmetic is always done in as high a degree of precision as the variable with the highest degree of precision. For example, consider the following type declarations:

```
float f_short;
double f_long;
long double f_longer;

f_short = f_short * f_long;
```

In the preceding example, the variable `f_short` is promoted to type **double** and multiplied by `f_long`; then the result is rounded to type **float** before being assigned to `f_short`.

In the example below (which uses the declarations from the preceding example), the arithmetic is done in **float** (32-bit) precision on the variables; the result is then promoted to type **long double**.

```
f_longer = f_short * f_short;
```

## Declaring Functions That Return Floating-Point Types

You can declare functions that return the floating-point types **float**, **double**, and **long double**. Functions that return types **float** or **double** do not place their return values in registers; they place their return values in a global location called the floating-point accumulator (**_ _fac**). Functions that return the type **long double**

**Who?**

**What?**

**When?**

**Where?**

**Why?**

**How?**

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# Writing

Sometimes just getting started can be the hardest part of any writing assignment — be it a memo, a trip report, or a procedures manual.

There are four basic steps to consider:

- ☐ Planning;
- ☐ Drafting;
- ☐ Editing; and
- ☐ Testing.

## Planning

During *planning* it is important to look at the entire subject. You must clarify your purpose and gather information about the subject of the report or manual. Cover the whole field. Consider all the notes, research, references, and manuals you have on the subject. Next, you must organize your thoughts by thinking of the audience and then arranging your thoughts (or content) to best suit your audience.

## Drafting

The *drafting* stage is never perfect. At this stage your aim is to produce a *first draft* to get your ideas on paper. Trying to edit as you write will slow down the process.

## Editing

*Editing* includes rethinking, revision, and rewriting. It also includes correcting grammar, style, and punctuation and checking facts. It can also involve major structural editing or

substantial rewriting. For the purposes of this training program, it also includes design and layout.

## Testing

*Testing* involves seeking input from the people who will actually use the manual or report you are writing. It is especially important to test instruction, procedures, and installations manuals to ensure that all steps are clear and that users understand and can use the materials under actual conditions.

# Planning

Planning is used to clarify what you should be writing and to organize your thoughts.

## Purpose

The first step in planning is to define your purpose. It is useful to talk to colleagues and to people who will be using the manual you are writing. Discuss such topics as orientation, content, level of detail, format, and physical form. The objective is to clarify what users *need* and *want*.

As much as possible, involve users in your work. You may think you know what they need, but they know what they want. Discuss the purpose of the manual or report until you are clear about what is needed and wanted. The purpose might be to document, report, discuss, inform, recommend, instruct, or persuade.

## Develop your ideas

Several steps can be taken to develop your ideas:

- ☐ Research — find out what has been done before, look at the work of others.
- ☐ Talk to colleagues — they may be able to suggest areas that need emphasis.
- ☐ Talk to users — find out what they need and why.
- ☐ Observe users — when writing a manual, watch people who are trying to do what you will be writing about. See where they have difficulty.
- ☐ Participate — try to perform the task yourself under actual conditions.

## Outline

You know your subject. You have done your research. You know many different things about the subject. What you need to do is decide what to include and how to organize this information.

One way is to write down the main topic first. Then write down a series of related topics — really only words that prompt you to other subjects you might wish to cover in the writing assignment.

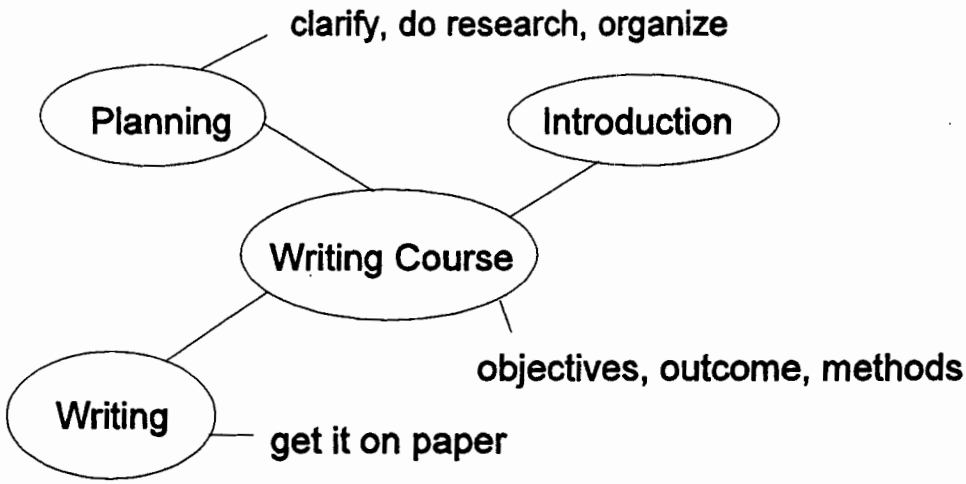
For example:

For this training manual, I might have started out like this:

writing course
- — introduction — objectives, outcome, methods
- — getting started — steps (plan, write, edit)
- — planning — clarify, do research, organize
- — elements — beginning, middle, end
- — writing — get on paper
- — editing — review message, style, spelling
- — design and layout — headings, font, white space

I like to write out my ideas in this type of point-form manner. Others may prefer a more graphic approach.

For example:




It really doesn't matter what method you choose, or what way works best for you. Anything that gets you to think about your subject and its components and to organize your thoughts will do.

## Organization

Most of the material you will need to produce will be used to document project results, provide guidance to others, or report to other organizations. These types of written materials usually convey information to inform or instruct the reader.

In the simplest terms, we can think of these reports as having three parts — a beginning, a middle, and an end.

### Beginning

Summary or abstract
States purpose
Gives quick overview of subject
Usually written last

### Middle

Explains subject in detail
Presents findings, observations, and discussion
Provides tables, figures, data, explanations, and examples
Usually written first

### End

Recaps the main ideas
Provides conclusions
Makes recommendations
Usually written second

The middle is usually written first because the other parts either introduce or summarize the middle.

## Order

Within each of these sections, the pieces must fall into a logical order. Most technical reports and manuals are ordered by time (chronologically), for example:

Instructions (how to)
Explaining how something works
Explaining steps to follow
Trip reports
Minutes
Work schedules
Project reports

## Exercise 2

On the opposite page develop a brief outline for a 3–5 minute presentation you might make to explain some aspect of the Snow and Ice Hydrology project. For example, explain to me how to complete some task that you do for the project.

**Purpose**

**What to include**

**Organize**

**Begin with:**

**Middle will include:**

**End with:**

# Drafting

Most writers recommend that it is best to write your ideas without trying to edit as you go. Get the main points down on paper or into the computer. If you make a mistake leave it for now; if you can't think of exactly the right phrase or word leave a blank and come back to it later.

## Get started

The objective is to get a first draft. Nothing comes out perfectly the first time. The draft must be edited. Remember that errors and omissions will be caught during the next stage — the editing phase.

Stray ideas are useful. Jot them down as you go and use them as a reminder when you get to the appropriate part of the report.

Get started and keep going. Do not stop to revise. The objective is to get through the report once. *Produce a first draft.*

## Use your outline

Use your outline to organize your thoughts. If you have trouble getting started, review your outline and choose the section that you are most comfortable with. Start there. Keep going until you have something written for each of the sections of the report.

### Think of who? what? when? where? why? and how?

If you are unsure of what to include, write out and answer these questions as you prepare your draft.

### Speak to colleagues

Share ideas with colleagues and ask for their input and suggestions. Don't be afraid of criticism.

### Control your environment

To write you need to be able to concentrate. If possible, arrange to be away from telephones and other people. Find a location that is quiet and has ready access to any reference materials you might need as you write.

## Exercise 3

Use the outline that you developed to draft a few paragraphs about your topic. Please write on the opposite page.

**First draft**

# Editing

Editing includes:

- ☐ Making sure the manuscript is complete;
- ☐ Looking for ways to improve the organization;
- ☐ Verifying facts;
- ☐ Improving the wording to make the text easier to read and understand;
- ☐ Checking and correcting spelling, grammar, and punctuation;
- ☐ Inserting headings;
- ☐ Checking the accuracy and style of notes and references;
- ☐ Making sure that abbreviations and units of measurement are used appropriately and consistently;
- ☐ Making sure tables and illustrations are used effectively, agree with the text, and are suitable for reproduction; and
- ☐ Visualizing how the publication will look.

We will review the details of these editing tasks.

Several things will help you edit your own work.

- ☐ ***Sleep on it.*** After you have your first draft, put it away for a day or two. You can then come back to it with a fresh point of view.
- ☐ ***Edit and re-edit.*** It also helps to ask others to read and comment on what you have written. Especially useful are comments from people who will have to use what you are writing. As you edit, read out loud, especially the key points or sentences that don't seem quite right. When you write, write double spaced to leave room for comments and changes.

- ☐ ***Organize.*** Make sure that you have focussed on the objectives, included all important points, and placed things in a logical sequence.

The purpose of editing is to ensure clarity.

As an author you have something to say — a new or improved way to install a sensor, a set of procedures for monitoring, a report to IDRC, or a memorandum to a supervisor.

There are people who need that knowledge or information — technicians, bureaucrats, or co-workers. You must make sure you write in a way that these people will understand your ideas and take whatever action is appropriate.

As you write, you must constantly ask: *Will the reader understand this?*

***It is critical to always remember the reader.***

## Exercise 4

Before our next session, please edit your own work. Remember to read it carefully and to ask yourself — will Michael understand this?

**Second draft**

# Testing

Once you are satisfied with the edited first draft, you should share the document with others. Here are some suggestions.

- ☐ **Don't work in a vacuum.** Don't try to create a *masterpiece* before you show it to anyone. Circulate your draft to your colleagues as well as potential users. Talk to them, find out what works and what needs work.

- ☐ **Get feedback.** Don't just ask people if the meaning is clear to them. Ask them to tell you, in their own words, what they think a section or sentence means. For procedures, ask them to actually carry out the procedures while you watch them. Try not to do this with a couple of friends. They may be familiar with the topic and the way you write. The best method is to get feedback from a sample of people who will actually use the document.

- ☐ **Be wary of readability formulas.** Readability formulas (such as the Flesch test) measure word and sentence length and can be useful. However, the main test of a document should be: *Is it clear to the intended user?* The best way to test a document (especially a procedure or maintenance manual) is to have a sample of readers try to use it.

# Editing and Rewriting

Editing is part of your responsibility as a writer. You must edit and re-edit your work before it is finalized. Sometimes we are also called on to provide input to a colleague's written work, review the technical accuracy of a report, or approve a manuscript for publication. In all these cases, the single most important rule of editing is:

***Remember the reader.***

Almost every editorial question can be answered by asking:

- ☐ What do these readers need to know?
- ☐ What will these readers understand?
- ☐ What will interest these readers?
- ☐ What will be best for these readers?

For manuals, we are most concerned with the first two questions. The question of "best" includes how the manual is designed and layed out.

Review and revision are critical steps in developing any publication. However, as we suggest changes, we must not introduce errors, must not change the meaning (unless the original is incorrect), and only make changes that are really improvements.

# Getting the Most Out of Words

Words carry our ideas. How words are used determines how well we are understood. In this section we will review how to use words effectively.

## Use concrete words

*Prefer the specific to the general, the definite to the vague, the concrete to the abstract.*
William Strunk, Jr.

This important suggestion was made by Professor William Strunk of Cornell University many years ago. He said that the surest way to arouse and hold the attention of readers is to be specific, definite, and concrete. This is also the surest way to help the author and the reader communicate clearly and directly. Test words and sentences against this rule.

Compare:

| | |
|---|---|
| ***There was an interruption in the transmission of electrical energy from the power utility to our office.*** | ***The power went off in our office.*** |
| ***The crop was poor because of unfavourable weather conditions.*** | ***Twenty percent of the crop was destroyed by typhoons and floods.*** |

Which statements communicate more clearly?

## Exercise 5

Rearrange the following statements in decreasing order of abstraction. The most abstract, general statement should be at the beginning. The most concrete, specific statement should be at the end.

1. Ahmed makes sure all our publications are of high quality.

2. Ahmed edited one of my research reports yesterday.

3. Ahmed edits the text of our publications to meet international standards.

4. Ahmed is useful to have at the institute.

5. Ahmed is a good colleague.

6. Ahmed pays special attention to research reports.

Which of these statements are purely factual and can be proved? Which cannot be proved or disproved?

1. Mrs Ching has a kind heart.

2. Michael Graham lives in Canada.

3. Faouzia loves her father.

4. WAPDA is located in Lahore, Pakistan.

5. Mr Pande never drinks beer.

6. Mira reads only good books.

## Use precise words

Don't be satisfied with a description of something as fast, slow, good, bad, unusual, or interesting. Words like these create a positive or negative emotion, but don't carry much information. You may understand exactly what you mean, but will the reader? Use measures and quantities when possible. Say how fast or slow, or why something is good, bad, unusual, or interesting.

| | |
|---|---|
| ***The sun is very hot.*** | ***The sun is hot — about 2200 °C at its surface.*** |
| ***August rainfall is normally heavy.*** | ***The mean rainfall for August is 940 mm.*** |
| ***Transplant the seedlings properly.*** | ***Transplant the seedlings in straight rows 20 or 25 cm apart. Place two seedlings in each hill, 2–3 cm deep.*** |

In particular, *very* should be studied closely every time it appears. Does it add any information? Delete it when possible. Sometimes a single word is more effective than "very" followed by an adjective or adverb.

| | |
|---|---|
| ***The modem is very fast.*** | ***The modem is 28,800 baud. OR It is a 28,800 baud modem.*** |

### Add details if necessary to make sure the reader understands clearly what is meant

When possible, use concrete words that will build pictures in the reader's mind.

| | |
|---|---|
| ***Rural infrastructure development has the capacity to catalyze significant non-farm employment.*** | ***Building roads, schools, hospitals, dams, and other public works can provide many jobs for rural people.*** |

### Use words the reader can understand

Consider the intended reader's educational level. Watch for words that are highly specialized or simply make it much too difficult to figure out the meaning.

| | |
|---|---|
| ***Women are involved in the disposal of the output of rice production.*** | ***Women help sell the rice.*** |
| ***Long airplane trips may lead to transmeridianal dychronism.*** | ***After a long airplane trip you may have jet lag.*** |
| ***A passive solar illumination assembly.*** | ***A window.*** |
| ***An avian embryo nutrient confinement.*** | ***An egg.*** |

## Use simple, direct words rather than long words or expressions

*Get to the point as directly as you can; never use a big word if a little one will do.*
Emily Carr

Here are some examples:

| | |
|---|---|
| a large number of | many |
| a great deal of | much |
| accomplish | do |
| additionally | also |
| adequate | enough |
| affirmative | yes |
| ameliorate | improve |
| approximately | about |
| assist | help |
| at the present time | now |
| attendance at | attend |
| beneficial | helpful |
| close proximity to | near |
| cognizant | know |
| commence | begin |
| component | part |
| conceptualize | plan |
| despite the fact that | although |
| due to the fact that | because |
| during the course of | during |
| employ | use |
| endeavour | try |
| exerts a lethal effect | kills |
| facilitate | help |

| | |
|---|---|
| finalize | finish |
| for the purpose of | to, for |
| frequently | often |
| hold a meeting | meet |
| implement | do |
| in view of the fact that | because |
| in some cases | sometimes |
| in the initial instance | at first |
| in the event that | if |
| initial | first |
| initiate | begin |
| inquire | ask |
| inundate | flood |
| is equipped with | has |
| large number of | many |
| magnitude | size |
| make a study of | study |
| malfunction | failure |
| meaningful | good |
| modification | change |
| negative | no |
| obtain | get |
| operational difficulties | problems |
| optimum | best |
| pass away | die |
| prior to | before |
| proceed | go |
| purchase | buy |
| remunerate | pay |
| request | ask |
| state of the art | most up to date, advanced |
| subsequent | next |
| subsequent to | after |

| | |
|---|---|
| sufficient | enough |
| take into consideration | consider |
| the present paper | this paper |
| the present writer | I |
| until such time as | until |
| utilization | use |
| utilize | use |
| with a small amount of effort | easily |
| with reference to | about |

Shorter, more direct words save paper, money, and time. They have fewer letters to typeset and print; they also have fewer to read, which saves readers' time. Just think: to change *utilization* (11 letters) to *use* (3 letters) is an increase in efficiency of 267%. Any engineer would be delighted to obtain such an improvement in design efficiency.

## Exercise 6

Most of these expressions and words are used by engineers, technicians, and scientists when they write. For each, suggest a simpler and more direct word or expression. (For example, for "commence" use "begin" or "start.")

commence

an abundance of

remunerate

frequently

prior to that time

close proximity to

purchase

magnitude

for the purpose of

in the majority of cases

make enquiry regarding

hold a meeting

utilization

terminate

initiate

is equipped with

## Exercise 7

Edit these sentences to make them easier for the reader to understand. Write your revision below the original.

1. These ideas have very many different origins.

2. The herd furnished a sufficient quantity of milk.

3. The use of a tractor facilitates plowing.

4. It is my opinion that the department should now embrace policy direction.

5. The advent and employment of modern farm machinery has made farming easier.

6. Greater ease in comprehension of the author-produced communication may be stated as the essential goal of the editorial worker.

## Cut jargon ruthlessly

Jargon is a language that has grown up in government, business, science, and other bureaucracies. It tries to make the message and its sender seem important. It uses long words that sound impressive when simpler words exist; it uses several words when one would do the job; it uses complex sentences when the same thought could be said more directly. It makes the message more difficult to understand.

*If language is not correct, then what is said is not what is meant; if what is said is not what is meant, then what ought to be done remains undone.*

Confucius

| | |
|---|---|
| ***On average, among adults total food intake was higher for males than for females.*** | ***On average, men ate more than women.*** |
| ***The shift in production technology that takes the form of substituting machines for labour connotes the presence of prior changes in the traditional production mode.*** | ***Before farmers start using machinery, they usually have adopted other changes in the way they grow their crops.*** |
| ***It must be emphasized that nothing in this plan is self-fulfilling and the plan is as good as its implementation. Formulation of the plan is one thing and operationalization is another thing.*** | ***It is not enough to make this plan. It must be carried out.*** |

| | |
|---|---|
| ***A proper functioning of this component is critically dependent upon its maintaining dimensional integrity.*** | ***This won't work if it is bent.*** |
| ***They acceded to the proposition to approve the contractual relationship.*** | ***They agreed to the contract.*** |

# Writing Effective Sentences

Good writing combines verbs, nouns, pronouns, adjectives, and adverbs to give them force. Here are some suggestions for writing good sentences.

## Use verbs in the active voice

Verbs can be active or passive. In the active voice, somebody does something; in the passive voice, something is done. The active voice carries the action; the passive voice has it carried.

Sentences with active verbs are more natural and have more force than sentences with passive verbs. Usually sentences with active verbs need fewer words; their meaning is clearer; the subject is prominent; the object comes later, receiving the action.

Passive verbs may deaden the impact and add words; sometimes they may confuse the reader. Formal studies have found that it takes up to 25% more time to understand passive statements and that the users are more likely to misunderstand passive statements.

| | |
|---|---|
| ***The training plan has been discussed by us.*** | ***We discussed the training plan.*** |
| ***In this paper, the second approach is considered.*** | ***This paper considers the second approach.*** |
| ***The screening procedure is illustrated in Figure 5.*** | ***Figure 5 shows the screening procedure.*** |
| ***Table 3 shows that the incidence of disease was decreased 10%.*** | ***The incidence of disease decreased 10% (Table 3).*** |

| | |
|---|---|
| ***Bids were submitted by our purchasing department.*** | ***Our purchasing department submitted bids.*** |
| ***The users should complete the form*** | ***(Please) Complete the form.*** |

Nevertheless, there are times when passive verbs are preferable, especially when reporting research. Passive verbs may be used effectively when the person doing the action is unknown or unimportant, or is less important than the action itself.

***Corn was cultivated five thousand years ago.***

The passive is particularly useful when describing materials and methods in a formal research report. Using the passive avoids repeated references to the person doing the research.

But the passive is also used for less acceptable reasons. Many researchers prefer the passive because it places the person doing the action at a distance. Often the person is not even mentioned. Reports in the passive voice sound impersonal and objective, and therefore may appear more reliable.

| | |
|---|---|
| ***It was found that the coliform levels were higher downstream.*** | ***We found that coliform levels were higher downstream. OR Coliform levels were higher downstream.*** |

Not all verbs should be active. The passive is often preferable, if only for variety. Yet every passive verb is worth examining, to see whether the active voice would be more effective

## Exercise 8

Rewrite these sentences to make the verbs active. Make any other improvements you think might be needed. Write your revision under the original sentence.

1. My theory is proved with this evidence.

2. A review was done of the relevant regulations.

3. The database is a store of information.

4. The annual report was written by the director general himself.

5. The data, showing a 25 percent increase in flow rate, are summarized in Table 9.

6. From the present experiment, it could be concluded that pest control might be achieved effectively through natural enemies.

7. Continuous freshwater supply is necessary in the hatchery.

8. A field day will be held on October 15 by the Ministry using its extension specialists.

## Use strong verbs and avoid weak ones

Especially avoid the verb "to be" in all its forms. It is the weakest and most passive of all verbs. It simply exists. It just sits there. Look for stronger verbs to take its place. In particular, look for sentences that start with such phrases as *It is* and *There are.*

| | |
|---|---|
| ***It is believed by us ...*** | ***We believe ...*** |
| ***It would be appreciated if you would do this today.*** | ***Please do this today.*** |
| ***It is my recommendation that ...*** | ***I recommend that ...*** |
| ***There is no uniform procedure followed ...*** | ***No uniform procedure is followed ...*** |
| ***There are six people in the group.*** | ***The group has six people.*** |

Other weak verbs are get, take, do, and make. Look for stronger substitutes.

| | |
|---|---|
| ***I got the message to her.*** | ***I sent her the message.*** |
| ***Take the turn to the right.*** | ***Turn right.*** |

## Use an infinitive rather than a phrase

The infinitive is usually shorter and clearer than a phrase.

| | |
|---|---|
| ***Pat went home for the purpose of studying.*** | ***Pat went home to study.*** |
| ***They increased the lighting so that they could improve the working conditions.*** | ***They increased the lighting to improve the working conditions.*** |

## Use action verbs, not abstract nouns

Verbs are usually clearer than nouns. Abstract nouns can be recognized by the endings *ion, ment, ation, ance, ence, and osity.* If we eliminate these abstract nouns, we link the action to the person or thing that is doing the action. When we must revise a complicated sentence, it is often useful to ask: "Who does what?" Then bring the *who* and the *what* together.

| | |
|---|---|
| ***An examination of each part is made by our inspectors.*** | ***Our inspectors examine each part.*** |
| ***Issuance of your cheque will follow receipt of your voucher.*** | ***When we receive your voucher, we will issue your cheque.*** |
| ***The acquisition of just this one habit by writers would effect a great improvement in their writing.*** | ***If writers would acquire just this one habit, they would greatly improve their writing.*** |
| ***The decision to go there was made by them.*** | ***They decided to go there.*** |

Here are some examples of abstract nouns and the verbs they can be turned into.

| | |
|---|---|
| allocation | allocate |
| assessment | assess |
| assumption | assume |
| classification | classify |
| collection | collect |
| dependence | depend |
| documentation | document |
| evaluation | evaluate |
| examination | examine |
| improvement | improve |
| inspection | inspect |
| management | manage |
| opposition to | oppose |
| performance | perform |
| recognition | recognize |
| referral | refer |
| reliance | rely |
| repayment | repay |
| supervision | supervise |
| utilization | use, utilize |

## Avoid noun strings

Don't string nouns together as adjectives. We frequently make two nouns into a single expression — for example *energy resources* or *computer hardware*. This presents no problem.

Three or four nouns in a row are harder to read. Such strings of nouns seem impressive and they do pack a great deal of information into a few words. But the density of information is so great that it can be almost impenetrable.

| | |
|---|---|
| ***Guidelines enforcement for laboratory worker safety is a management responsibility.*** | ***Management is responsible for enforcing guidelines for the safety of laboratory workers.*** |
| ***A computer hardware maintenance course ...*** | ***A course in maintenance of computer hardware ...*** |
| ***The equipment calibration procedures manual cover is green.*** | ***The cover of the manual on calibration procedures is green.*** |

Avoid the temptation to add hyphens to try to make the meaning clearer. A computer-hardware maintenance course is not much of an improvement. You still force the reader to stop and re-read sentence to sort out the meaning.

## Keep related words together

The reader must be able to see relationships between building blocks in a sentence. If two words or phrases are close together, the reader can tell easily that they are related to each other. If they are separated by other words, the reader may be confused.

In the following two sentences only one word has changed position, but the meaning has been completely altered.

***The government must be able to predict each year the amount of water that will flow early.***

***The government must be able to predict early each year the amount of water that will flow.***

Sometimes related words or phrases are separated by so many other words that the reader loses the message.

***In this report I am going to describe how the human resources are utilized for tapping the skills of "women in technology," which so far had been only monopolized by men, to satisfy the basic needs of a supply of drinking water in the area where they live at the village level.***

***This report describes how women in the villages obtain drinking water by using technology that had been previously monopolized by men.***

Watch out, in particular, for the placement of *not* and *only*. If these simple words are in the wrong position, the message can be changed.

***All the insects were not killed by the spraying. (That is, all survived.)***

***Not all the insects were killed by the spraying. (That is, some survived.)***

Often the meaning is clear no matter where *only* is placed; but

Often the meaning is clear no matter where *only* is placed; but consider the following examples, any one of which might be correct.

***One percent only spoke English.***
*(They couldn't write it.)*

***Only one percent spoke English.***
*(Very few people knew English.)*

***One percent spoke only English.***
*(They had no second language.)*

## Exercise 9

Review the following sentences. Eliminate strings of nouns or phrases, make verbs active, tie the agent to the verb, and suggest other changes that would make the sentence more readable. Write your revision in the space below each example.

1. Soil moisture status governs the success of chemical weed control in upland rice.

2. Photographic subject acquisition policies will be determined by the information department head.

3. The main goal of this article is to describe text comprehension processes.

4. Normally, all mosquitoes are not killed in an effective spraying program.

5. Examination of present policies and procedures of implementation for standardization of equipment and materials used in three regions over the period of two years was carried out.

# Readability

Here are some more suggestions that will help make your writing easier to read.

## One thought per sentence

Ordinarily, a sentence expresses one thought. When that thought is complete, the sentence ends with a period. Then a new sentence (and a new thought) begins.

The reader can absorb only a certain amount of information at one time. If your thoughts march in an orderly parade across the page, one at a time, sentence by sentence, the reader will find them easier to understand.

Sentences should not all be the same length: that would be boring. Some should be short, some long, for variety and emphasis. But no single sentence should contain more information than can be grasped easily in a single reading. Here is an extreme example, containing 70 words and five complete thoughts. Is it easier to understand in the revision?

***Notable among the activities during the year was the convening of a National Workshop on Science and Technology policy which was a follow up of several previous recommendations at different scientific and political fora, including the recommendations of an UNCTAD mission in 1980 which at the invitation of the Government reviewed the framework of policies and institutions undertaking activities related to technology, and advised on future technology policies and planning.***

***A notable activity during the year was the convening of a National Workshop on Science and Technology Policy. Such a meeting had been recommended by several previous scientific and political gatherings. One of these was an UNCTAD mission which was invited by the Government in 1980 to undertake two tasks: first, to review policies and institutions active in areas related to technology; second, to advise on future technology policies and planning.***

According to several experts, a good average length for sentences is 20 words or slightly fewer. That is in writing for the general public. Scientific and technical writing often averages 30 words or more per sentence, but it can be much more difficult to read. In general, keep sentences short.

## Look for short, simple words

Short, simple words are usually easier to read and understand than long, complex ones.

When reporting or explaining scientific or technical work, it is difficult to limit words to only one or two syllables. There is no need to avoid long words, just because they are long, if they are technically accurate or communicate precisely. But many writers use long words when shorter ones are just as correct.

## Remove unnecessary words

Every piece of writing contains words that aren't working as hard as they should. Some words aren't working at all. Most manuscripts can be cut by at least 10% without losing a single thought. Some can be cut much more than that.

| | |
|---|---|
| ***At present, there are approximately 2,000,000 apple trees in Indonesia with the centre of production in East Java. Leaves are hand-stripped off these trees every six months so they can enter a dormant period.*** | ***Indonesia has about two million apple trees, mainly in East Java. Their leaves are hand-stripped every six months so the trees can lie dormant.*** |
| ***In the majority of instances, an editorial worker exhibits the ability to fully eliminate the different varieties of unnecessary words.*** | ***Most editors can remove unnecessary words.*** |

It takes effort to write without waste. A man once apologized to a friend: *I am sorry to write such a long letter, but I don't have time to write a short one.*

Watch especially phrases like *in terms of* (which can often be cut) or *up to the present time* (which becomes *till now*). *All of* can usually be reduced to *all*, *It is the intention of the present writer* shrinks to *I intend*, and *in order to* becomes *to*.

*It is very interesting that . . .* can nearly always be deleted: if a fact is interesting it should appear so on its own without the reader having to be told. *It will be obvious from the above brief comments . . .* can also be cut, especially if the fact really is obvious.

A good gardener prunes trees and plants to make them more efficient. In the same way, sentences can be made more efficient by pruning.

The opportunities for pruning are enormous. All that is needed is a little time, practice, a sharp eye, and a sharp pencil.

## Explain things in a positive way

Most readers, like people generally, prefer positive statements. Readers are more likely to respond better to a positive message. The same information can be reported in different ways, but one may sound gloomy, the other factual.

| | |
|---|---|
| ***The rate of submission of articles is not changing very much.*** | ***Articles are being submitted at about the same rate.*** |

It is especially important to be positive when giving instructions. It is usually more useful to know what to do rather than what not to do.

| | |
|---|---|
| ***Discard seeds that are improperly filled, chaffy, split or broken, shrivelled, or show signs of fungal infection.*** | ***Select good seeds. These should be whole, plump, and heavy, with a smooth and clean seed coat.*** |

The statement on the left by itself is not clear enough. The readers have more complete information (what to look for) in the positive statement on the right.

Many writers seem to fear direct statements. They pepper their writing with phrases like *It would seem that on occasion*

and . . . *at the time of writing, evidence suggests.* Usually some of the qualifying words can be removed without changing the overall meaning.

## Avoid negatives, be positive

It is a good idea to revise a sentence to avoid using the word not. Such a change makes the sentence more positive. It also has a practical advantage. Readers sometimes skip over *not.* If they do, your meaning is reversed. That can't happen if *not necessary* is changed to *optional* or *did not pay attention to* becomes *ignored.*

Double negatives cause confusion. They should be changed to a positive statement.

| | |
|---|---|
| ***They were not absent.*** | ***They were present.*** |
| ***They did not fail the test.*** | ***They passed the test.*** |
| ***Do not do this until it is needed.*** | ***Do this only when needed.*** |
| ***Pat is not often late.*** | ***Pat is usually on time.*** |

Here are some double negatives that tend to slip into our writing. The words on the right give the reader a clearer meaning.

| | |
|---|---|
| not ... until | only when |
| not ... except | only if |
| not ... unless | only if |
| not ... reject | accept |
| not ... disagree | agree |
| not ... illegal | legal |

| | |
|---|---|
| not ... fail | succeed, passed |
| not ... absent | present |
| not ... unlike | like |
| not ... often | usually |

## Bring the writing as close as possible to speaking

Written language is different from spoken language. Writing is more formal than speech. Scientific writing is more formal than general writing. Even so, it is always helpful to listen to what has been written.

One way to untangle a complex thought or a complex sentence is to ask: *How would I say this if I were explaining it to someone sitting in front of me?* Spoken language has the advantage of being fairly simple and straightforward. If a sentence sounds good, it will probably be easy to read.

Many of us were taught in school that writing should be complex, with long words and fancy phrases. That kind of writing is intended to impress as much as to communicate. The results of research or the steps in a procedures manual must be communicated more efficiently.

Truly readable manuals and reports are not full of *long words and fancy phrases.* They are simple, straightforward, and concise. They carry the message in a smooth, straight line from author to reader.

## For instructions, bring the verb to the front

Writing instructions for tasks or procedures demands special attention. You achieve greater clarity if you use a point-form type of presentation and place the verb at the start of the instruction.

To write a step-by-step procedure, follow these steps:

- ☐ Place the verb first in most sentences.
- ☐ Put all steps in a logical sequence.
- ☐ Avoid "must be" and "should be" — *Turn up the volume* is clearer than *The volume must be turned up.*
- ☐ Keep words, sentences, and paragraphs short.
- ☐ Break up the text with headings (a minimum of 2–3 per page).
- ☐ Include a visual image if possible.
- ☐ Start warnings with *Avoid* and *DO NOT* rather than *Must not* and *Should not.*

  ***Avoid inhaling spray.***
  ***DO NOT use near open flame.***

## Emphasize the *why* of things, not just the *how*

Explanations and examples of how to do something are important. But, if that is all the information you provide in a manual, users will be limited to doing what you tell them. They won't know what to do if you haven't covered that situation. If you tell them why, they will have a better understanding of what's going on and how to handle unusual situations and problems.

## Exercise 10

Break these two long sentences into two or more sentences. Write your version below the original.

1. To be sure you have gotten a chance to see each employee's card at the time he is certified, I would advise each of you to initial on the same line as the supervisor with your initial, so that you can definitely know whether or not you have seen the card.

2. Furthering the executive committee's recent authorization of making arrangements with Mr. William Smith, who will conduct two clinics with the purpose of simplifying and making readable written material in the institute, the director general requests that samples of all written material, typical of that prepared by each department, be forwarded to him by Monday in order that it can be given to Mr. Smith for analysis.

## Exercise 11

Revise these sentences to give them added force by using short simple words and strong verbs. Follow other rules for readability as well.

1. The three weed species had different rates of development.

2. Rice culture under permanently inundated conditions is an effective method for suppressing weed growth.

3. The data reflecting increased flow rates of as much as 10 percent are shown in Figure 4.

4. It is our belief that there should be consultation by the administrators with the staff before changes in office regulations are made.

5. A very significant contribution to the literature on the subject is Khan's explanation, written in 1984, of the causes for emigration of unemployed workers from areas with a lack of sufficient capital.

## Exercise 12

**Remove the unnecessary words from these sentences.**

1. During that period of time, the stomach area became pink in colour and tender in feeling.

2. The holes must be aligned in an accurate manner.

3. The book was 2 kg in weight.

4. We investigated many different varieties of wheat.

# Organization

Sometimes a manual or report is hard to understand because the author has used difficult words, passive verbs, and long and complex sentences.

Other documents are hard to understand for a more basic reason. The material is not organized in a logical way. A manual or report that is easy to understand usually moves in a straight line, one step after another, from beginning to end.

Documents are normally organized so that you discuss broad areas before specific ones.

| | | |
|---|---|---|
| General interest topics | ***before*** | Specific interest topics |
| Principles | ***before*** | Details |
| Important details | ***before*** | Minor details |

Teachers of writing suggest that there are some basic rules for good organization of most written material. Their model structure consists of:

- ☐ An introduction of one or more paragraphs. This explains the subject of the article or report and captures the reader's attention. It may also set out the plan of what will follow.

- ☐ The body of the text. This consists of a number of paragraphs. Each paragraph deals with one section or subsection of the subject. The body should be organized in a logical manner, and the reader should be able to spot the logic easily. Four common methods of organization are:

***chronological***: starting at the beginning and going to the end (e.g., the steps in installing a sensor; or procedures to judge the accuracy and recoverability of data)

***logical***: dividing a subject into analytical blocks (e.g., a set of procedures for conducting a study on the rate of water flow)

***cause and effect***: discussing the reasons for doing something and then showing the results (e.g., examining the impact of engineering improvements on sensor readings)

***comparison and contrast***: showing how two or more related things are similar or different (e.g., a comparison of the operation of two types of sensors under the same conditions)

- ☐ A conclusion that summarizes the main points and leaves the reader satisfied.

## Paragraphs

The introduction, body of the text, and conclusions are made up of paragraphs. A sentence expresses one thought. A paragraph is a group of related sentences that express one main idea.

Paragraphs consist of:

- ☐ A *topic sentence*, which states the main idea of the paragraph. The topic sentence may also indicate the limits of discussion in that paragraph.

- ☐ *Supporting sentences*, which develop the topic sentence with examples, statistics, reasons, facts, or quotations.

- Sometimes a *concluding sentence*, which sums up the paragraph and prepares the reader for what follows. Not every paragraph needs a concluding sentence, however. Once the supporting statements are made the discussion can often continue smoothly to the next paragraph without any summing up.

All the sentences in a paragraph should be related directly to the topic sentence and to each other.

Short paragraphs break up the text with white space. It is particularly important to use short paragraphs when the text is set in narrow columns.

You can alter the shape and length of paragraphs without changing the words. It is easy to shorten paragraphs, and that simple change can make a manuscript much more readable.

## Headings

Headings (and subheadings) are used to identify different sections or topics within the manual or report. They are usually set in slightly larger type, or in capitals, boldface, or italic.

Headings are important in any technical document. Readers tend to scan through a reference manual. The headings help them find topics of interest.

If there are too few headings, readers may feel lost, just as a driver may feel lost if there aren't enough signs along the road.

If there are too many different kinds of headings they can be confusing. In general, don't use more than three levels: important, less important, least important.

However, in some technical manuals and publications more than three levels of headings may be needed. In that case, different levels of numbering can be used: for example, 3.2.4 for section 3, subsection 2, sub-subsection 4. Numbered subheadings are especially useful if the manual contains many cross-references.

Headings should be short and meaningful. They should act as a short guide to the reader's eye. If they are too long or ambiguous, or do not stand out on the page, they will not help the reader.

Headings should stand on their own. They should contain enough information (even if only one word) to be useful. At the same time, readers should be able to follow the text without reading the heading. Never let the text refer back to the heading. (If the heading is *Calibration*, don't write the first sentence as *This can be done in two ways.* Instead, repeat the subject: *Calibrate the equipment either by hand or with a gauge.*)

In any section, headings of the same level should be similar in grammatical structure. They may all be nouns, or adjectives and nouns, or prepositional phrases, or even short sentences, but they should all be the same.

| | | |
|---|---|---|
| Installation | Installing | Install |
| Test | Testing | Test |
| Maintenance | Maintaining | Maintain |

## Lists

Complex statements can often be made simpler by breaking them down into lists of separate items. That way, each element in the statement stands on its own. The reader can consider each element separately and see how it relates to all the others in the list.

Compare the following two statements. Which is easier to read?

Macro-editing may include manuscript organization, improving transitions, wordiness, providing subheads, rewriting the introduction, checking logic, shortening, and changes in tone.

Macro-editing may include:

- ☐ manuscript organization;
- ☐ improving transitions;
- ☐ wordiness;
- ☐ providing subheads;
- ☐ rewriting of the introduction;
- ☐ checking logic;
- ☐ shortening; and
- ☐ changes in tone.

The list on the right is still confusing, however, the items in the list have different forms.

Within any one list, the items should be similar. They should be related by their nature. They should also be similar in grammatical structure: they may be nouns, verbs, participial phrases, or sentences, but they should all be the same.

Macro-editing may include:

- ☐ manuscript organization;
- ☐ improving transitions;
- ☐ wordiness;
- ☐ providing subheads;
- ☐ rewriting of the introduction;
- ☐ checking logic;
- ☐ shortening; and
- ☐ changes in tone.

Macro-editing may include:

- ☐ reorganizing the manuscript;
- ☐ improving transitions;
- ☐ eliminating wordiness;
- ☐ providing subheadings;
- ☐ rewriting the introduction;
- ☐ checking logic;
- ☐ shortening the manuscript; and
- ☐ changing the tone.

Within any list, as well, items should be roughly the same length. They may all be brief — one line each, or two or three lines — or they may each include several paragraphs of discussion.

A list is usually easier to understand if the items are arranged in a logical order. They may be set out, for example, in order of importance, or in a recognized geographical arrangement, or in alphabetical or chronological order. Lists are especially useful in setting out the steps in a process; for example, assembling a machine or editing a manuscript.

The separate items may be identified in various ways. If the order is not particularly important, the items may start with a typographic device (such as the □ used here). Other lists are better set out with numbers and letters. If there are many subdivisions, a complicated hierarchy may be needed to make the relationships clear.

## Connecting Words

Words can also be used to organize your writing and to help the reader understand the direction in which you are moving. For example:

| | |
|---|---|
| ***and, moreover, also, furthermore, or, as well*** | ***Here comes another fact or idea.*** |
| ***but, yet, still, although, however, nevertheless*** | ***Here comes something opposite.*** |
| ***as a result, because, thus, consequently, therefore*** | ***There's a connection here.*** |
| ***for example, for instance, that is, in other words*** | ***Here's more explanation.*** |
| ***in comparison, in contrast*** | ***We're comparing things.*** |
| ***finally, in conclusion*** | ***We're coming to the end.*** |

Good authors use such words. But every sentence doesn't need so obvious a connection to the previous one. In well-organized writing, connections are often evident without them.

# Editing for Detail

Once the initial editing and rewriting is complete, you must read your work one more time to examine details. It needs a separate reading because it demands a special kind of attention. It takes concentration and practice.

Editing for detail is often called copy editing or manuscript editing and is usually done by an in-house editor or an editor employed by the publisher. It is a careful, thorough search through the manuscript for accuracy and consistency — line by line, word by word, number by number, and letter by letter.

Here are some things to watch for in your final reading of the manuscript.

## Facts

**Facts must be correct.**

It is your responsibility to carefully check your work for accuracy. You place great care in making accurate measurements and conducting detailed field work. Your words and data must receive the same attention to detail.

Have you written *high* but meant *low*?

Has *now* been typed instead of *not* and reversed the meaning?

When a reader can spot an error easily and correct it mentally, no great harm is done. However, the reputations of the author and of the organization suffer.

Other errors could have more serious results. The wrong voltage setting in an operations manual could destroy an expensive piece of equipment and delay further work. The dosage on a bottle of medicine could harm thousands of people.

## Numbers

**Numbers must be accurate.**

Always check columns of numbers. If they are supposed to add to a certain total, check that they do. If a proportion is given, does it agree with the data already provided? Do the percentages add up to 100%?

Numbers need to be checked as carefully as words. If anything, they must be looked at more carefully, because typing errors in numbers are more difficult to spot.

**Numbers must be appropriate.**

They should not give more detail than is supported by the evidence. A series of whole numbers cannot produce averages correct to three decimal places. Nor should numbers give more detail than the reader can use. Numbers with too many figures may be more baffling than informative. It is easier to understand "12 million" than "12,003,453" and in most contexts the difference (0.03%) is unimportant.

**Numbers may be presented in different ways.**

Should a large number appear as "12,003,453" or "12 003 453"? The answer depends on the organization's style. IDRC, for example, uses a space.

**When should numbers appear as digits and when should they be spelled out?**

Again, rules differ: one rule is to spell out all whole numbers below 10, except when they appear with units of measurement or in a series that includes numbers greater than nine ("5, 8, 12, 15," not "five, eight, 12, 15").

## Units

**Units of measurement must be consistent.**

You should not jump back and forth between kilograms and pounds, for example. The units should be in common use and easy to understand. Most scientific and technical reports use metric or SI (Système International) units.

## Superlatives and Absolutes

**Be careful how you use superlatives and absolutes.**

Is something really the biggest or smallest, the first or last, the highest or lowest? Can such a statement be proven? Have you proven it in your report?

If you are uncertain, use a phrase such as *one of the biggest.* Watch especially words like *never, always,* and *unique.* It is often a good idea to use *rarely, usually,* and *unusual.* Remember that *unique* cannot be qualified: there is no such thing as *rather unique* or *very unique.*

## Names

**References to people and places demand special attention.**

Names must be spelled correctly. If someone is going to check one thing in a report, it will be the spelling of their name. Make sure names are correct.

## Spelling and Punctuation

Many organizations have a style manual that sets rules for presentation, nomenclature, abbreviations, and spelling. As an author, you should learn these rules and use them.

The same word should be spelled the same way throughout a publication, even if the dictionary does recognize two forms of spelling.

The most common misspellings are simply errors in typing. These errors are easy to miss because the eye slides over the wrong letters. *Commerical, behavorial, institite,* and *Kong Hong* are often typed for commercial, behavioral, institute, and Hong Kong.

English has a special problem in that there are two styles of spelling: British and American. Reports and manuals should use consistent spelling. The easiest way is to adopt one dictionary and follow its preferences.

However, the spelling of words in the names of organizations should not be changed. A *Center for Labor Management* keeps its *er* and *or* style of spelling even if your organization regularly spells the same words as *centre* and *labour.*

## Inconsistencies and errors

As an author you must also be alert for many kinds of inconsistencies and errors. Nouns and pronouns must agree in number and gender. Pronouns and modifiers must be close to the words they refer to. These and other basic rules of grammar should be followed. Otherwise your message may be confusing.

Here are some examples and suggested improvements.

| | |
|---|---|
| ***The number of cavities were lower in the detasseled corn plants.*** | ***The number of cavities was lower in the detasseled corn plants.*** |
| ***The veterinary staff visits the farmers, inspects the calves, and advises them on correct feeding and management practices.*** | ***The veterinary staff visits the farms, inspects the calves, and advises the farmers on correct feeding and management practices.*** |

## Punctuation

Punctuation marks not only show the reader how thoughts are related; they also give the reader a chance to pause between thoughts. A person reading aloud needs to stop from time to time to draw breath. Punctuation gives the reader mental breathing time.

Often punctuation is decided by an organization's own rules. For example, there are two styles for periods and commas at the ends of quotations. The final punctuation can be inside or outside the quotation marks. Most organizations favour keeping the punctuation inside. For example:

| | |
|---|---|
| ***John said: "I will check the punctuation."*** | ***John said: "I will check the punctuation".*** |

## Abbreviations

It is rarely necessary to identify the abbreviations for common units of measurement (e.g., kg, km, m, °C). Nor is it necessary to spell out the full names of organizations or countries that are well known to the readers by their initials (e.g., BCHIL, SIHP-II, UBC, WAPDA, WMO, CIDA).

In general, however, abbreviations should be identified clearly the first time they are used. In a book, abbreviations are normally identified the first time they appear in each chapter. The normal method is to put the abbreviations in parentheses: for example, *The University of British Columbia (UBC)* . . .

There is no need for an abbreviation if the term is not used again.

If a manual or report contains a large number of abbreviations that appear frequently throughout the text, a list of all abbreviations is often included at the beginning.

### Should periods be used?

Should the Water and Power Development Authority, for example, be known as *W.A.P.D.A.* or *WAPDA*? There is a trend toward dropping periods because the shorter form is neater and easier to read.

There has also been a trend toward dropping periods at the end of other abbreviations: *Mr.* becomes *Mr* in this style. In some publications, periods are even omitted after initials in the names of authors in lists of references (Ahmed, H S). Periods are never used after metric or SI units of measurement.

## Capitals

**What words should begin with capital letters?**

*The Government of Pakistan* or the *government of Pakistan*? The *Director of the Institute* or the *director of the institute*? The *Department of Economics* or *the department of economics*? No one questions that a title should be capitalized in front of a name (*Prime Minister Chrétien*), but after that should it be *the Prime Minister* or *the prime minister*?

There has been a trend toward *downstyle* — beginning fewer words with capitals — because capital letters slow reading. But many authors feel lowercase letters show disrespect.

## References

There are at least three major systems of citing references, and many variations on each. Within any one of these systems, consistency, and accuracy are essential.

The three main systems of citation are:

- ☐ Name and year (also called author–date) — the name(s) of the author(s) and the year of publication are placed in the text.
- ☐ Number — references are numbered in the order they are mentioned in the text.
- ☐ Number, with references in alphabetical order — the references are placed in alphabetical order, numbered in that order, and these numbers are used for citations in the text.

I prefer the first system because the reader knows who wrote the cited work and when it was published. Works by the same author are also listed together in the bibliography.

## Cross references

There is a chance for error every time you refer to another part of the publication: to a table, a figure, a chapter, or another page. Every cross-reference must be checked.

References to pages must be watched especially carefully. References are usually made to pages in the manuscript, but in printed form the page numbers will probably be different. It is a good idea to change cross-references in the manuscript to *page 000*, a number that is obviously wrong. Better yet, try to remove cross-references to specific pages.

## Time

The units should be appropriate. There is no sense in reporting times in fractions of an hour if the task takes only a few minutes. There are many choices: *February 25, 1986* or *February 25th, 1986* or *25 February 1986* or *25 Feb 1986*? *1600 hours* or *4 pm* or *four o'clock in the afternoon*? (But never *4 pm in the afternoon.*) Be consistent and use the house style.

## Tables and Illustrations

Tables, graphs, charts, drawings, and photographs must be checked against the text, and the text must be checked against them. Data in all places should be the same. Tables and illustrations present special editorial problems and are discussed in separate sections of this manual.

## Help

Fortunately, we do not have to make these decisions in isolation. Help is available in style manuals. *The Chicago Manual of Style*, published by the University of Chicago Press, is probably the most complete manual of its kind. It has more than 700 pages of advice, recommendations, and examples, together with a great deal of other information about editing and writing. Many organizations also have their own style manual.

It is a good idea keep a list of words or styles you have used. Write down unusual words the first time you make a decision about style or spelling. That way you can keep track of them, and of how you have decided to use them.

This can be very helpful if there is no style guide, and these style sheets can become the base for a guide in the future.

To sum up, here are five rules in editing for detail:

- ☐ Read your manuscript more than once. The last time, concentrate on detail.
- ☐ Check your facts. They must be accurate.
- ☐ Impose consistency. It helps communication.
- ☐ If you aren't sure of anything, look it up. Build the dictionary/style manual habit.
- ☐ Don't assume words and numbers are correct.

# Tables

Tables are an important part of scientific and technical writing. Therefore, they must be reviewed carefully. Many people read tables before reading the text; they may even consider the tables the most important part of a report. A good table is worth hundreds of words. A bad table may confuse the reader.

A table can present a large amount of detailed information in a small space and can make it easy to compare data. However, broad trends and interrelationships can often be shown more clearly in a graph, and the information in a small table often can be presented more easily, more briefly, and more clearly in one or two sentences in the text. Remember that a table may not be the most effective way to present your data.

Here are a list of questions to ask yourself about the tables you plan to include in your report or manual.

Does the table present information that is relevant and significant? Does the table contain data that is also in the text?

Is all the information in the table consistent with information in the text and other tables?

Does the table contain data also in a graph? If so, should either the table or the graph be omitted?

Is there a reference to the table in the text? Each table should be mentioned in the text. The reference should be by number. Avoid references to "the table above" or "the following table" or "the table on the next page."

Is the title satisfactory? Does it identify the table clearly and accurately?

Are the column headings clear, accurate, and appropriate? Are they brief and meaningful? Do they identify the units in which the data are reported? (Units of measurement should not be repeated in the body of the table.)

Would the column headings be easier to understand if they were grouped, using two or even three levels of headings? Such subheadings should be placed under straddle rules (thin lines stretching under the main heading).

Are abbreviations and symbols standard and easy to recognize? If not, are they explained in a footnote?

Are the sideheadings clear, accurate, and appropriate? Would they be easier to understand if they were grouped, with main entries followed by indented sub-entries?

Are breaks in numerical series clear? It may be ambiguous to break a numerical series as 0–10, 10–20, 20–30, etc. It is clearer to report, if only whole numbers are involved, 1–10, 11–20, 21–30, etc, or 0–9, 10–19, 20–29. etc.

Is there too much information in the table? Can some of the information be put in a footnote or in the title?

Are some columns unnecessary? For example, is it necessary to have a column that gives the total of two preceding columns if the numbers are so small the reader can add them mentally?

Have the data been presented appropriately? Are figures at a reasonable level of significance, given the units of measurement and the context? Figures should not be carried out to more places, and should not indicate greater accuracy, than is reasonable or is indicated by the data.

Is it necessary to report an area as 105,321 ha, or is it satisfactory to describe it as 105.3 in a column headed "x 1000 ha"? Should grain yield be reported as 7461 kg/ha or as 7.5 t/ha when the figure is only an average? Simpler figures save space. They remove clutter. They make it easier for the reader to see relationships and trends.

Are the data accurate? Check the accuracy of calculations within the table. If columns or rows end in totals, is the addition correct? Do columns of percentages total 100?

In numbers without a full number before the decimal point, does the number begin with a zero ("0.12" rather than ".12")?

Are missing data indicated correctly, usually with a dash?

Is there enough white space between columns to permit easy reading? Is there so much white space between columns that it is difficult to compare figures horizontally?

## Exercise 13

Use the things we have discussed in this section to redraft the table on the next page to make it easier for the reader to understand.

Create the new table on the blank page that follows the example table.

Pay particular attention to making the table easier to read, making the most important data prominent, and checking the accuracy of the data.

North American and other circulation, average numbers of subscriptions and relative shares, for 120 journals, by size bracket and type or publisher, 1987.

| | Number of journals | Average number of pages | North American | Per cent | Rest of world | Per cent | Total |
|---|---|---|---|---|---|---|---|
| By size bracket | | | | | | | |
| Circulation 6,000 or above | 25 | 2,140 | 8,530 | 73.3 | 3,100 | 26.7 | 11,630 |
| Circulation between 2,500 and 5,999 | 33 | 1,470 | 2,340 | 61.4 | 1,470 | 48.6 | 3,810 |
| Circulation between 1,000 and 2,499 | 42 | 1,320 | 750 | 54.0 | 640 | 46.0 | 1,390 |
| Circulation below 1,000 | 23 | 750 | 390 | 60.9 | 250 | 39.1 | 640 |
| All strata | 120 | 1,420 | 2,740 | 67.5 | 1,310 | 32.3 | 4,050 |
| Type of publisher | | | | | | | |
| Professional society | 51 | 1,710 | 4,320 | 73.6 | 1,550 | 26.4 | 5,870 |
| Research institute | 21 | 460 | 1,150 | 42.8 | 1,540 | 57.2 | 2,690 |
| Commercial publisher | 49 | 1,540 | 1,760 | 64.9 | 950 | 35.1 | 2,710 |
| All publishers | 120 | 1,420 | 2,740 | 67.7 | 1,310 | 32.3 | 4,050 |

**Draft the revised table here.**

# Illustrations

Illustrations can present special problems. Manuals, in particular, may require drawings to be effective. When should illustrations be used? Where should they be used? How should they be used? What kinds should be used?

There is sometimes a tendency to include more illustrations than are necessary. Illustrations require just as much review as words, numbers, and tables. They are likely to be studied before the words are read: people normally look at pictures first. Illustrations must meet technical standards, and they are just as likely as the text to contain errors, distortions, distractions, and confusions.

There are two types of illustrations: linedrawings and photographs.

Linedrawings include drawings, graphs, and maps. Although they are normally printed in black and white, they can be printed in black and white with one or more additional colours, or in full colour. Photographs can be printed in black and white, in another colour, or in full colour.

Like other decisions about the content of manuals and reports, the choice of which style of illustration is best depends on:

- ☐ The subject;
- ☐ The purpose;
- ☐ The intended readers; and
- ☐ The cost and available budget.

For example, you may want to use an illustration to show the exact location of a component on a circuit board.

In this case, you would have to be sure to give sufficient detail to orient the reader properly. You would want to show the location of other components, and might consider showing an enlargement of the specific location on the board. For this purpose, a line drawing would likely be best. A photograph would not be as useful.

## Advantages

Different types of illustrations have different purposes.

***Photographs*** show exactly what the camera sees. They reproduce exact tones, textures, colors, and details.

In addition, photographs are relatively cheap and fast to produce. Many photos can be taken in the time an artist needs to finish one drawing. However, in technical reports and manuals, line drawings are often more appropriate.

***Line drawings*** have certain advantages over photographs.

Drawings can control the viewer's perception by showing only essential details and omitting any unnecessary details.

The artist can emphasize differences and important points, by altering scale (for example, by magnifying one part of the subject) or by using a different tone or color. Three-dimensional drawings can give an exploded view of a complex subject like a piece of machinery.

Drawings can also show the direction of flow in a process and the relationships between components.

***Graphs*** are particularly valuable for showing relationships between variables.

***Maps*** show spatial relationships.

## Purposes

Illustrations should have a purpose. Each illustration should be examined with two questions in mind.

- ☐ How does this relate to the message?
- ☐ What is its purpose in relation to the text?

More specifically, here are some questions to ask about any illustration:

Does it provide important additional information? Illustrations provide some information far more clearly than words can do. In a manual, they can be used to show the exact way in which a piece of machinery should be adjusted.

Does it provide supplementary information? Sometimes an illustration is not essential but gives the text greater impact.

Does it attract attention? An illustration may be largely decorative such as the symbol of an institution. Such an illustration does not convey a great deal of information, but it may draw the reader's eye to the page and suggest what the message is about.

Does it do none of these? If an illustration does not provide essential or supplementary information or attract readers, why use it?

# Design and Layout

Bad design can make the best manual or report difficult to read. Good design can make it more readable.

The difference between good and bad design is partly a matter of personal opinion and of custom. We are surrounded by design.

Buildings are designed to meet building codes but also to serve a specific function and have a certain style. In the same way, publications follow codes (grammar, spelling, sentence structure) but must presented in a way that enhances their usefulness and appeal.

When the design is good, the object works well and is easy to use. When the design is poor, the object does not work well and is difficult to use. How many times have you encountered poor design? Perhaps it is an engine that works well but it nearly impossible to maintain because little thought was given to access to important components requiring regular maintenance. Perhaps it is a manual that is so tightly packed on the page, or the type is so small, that it is difficult to read.

Good design in print:

- ☐ Helps make the message clear and effective; and
- ☐ Saves time and effort because the message is easy to read.

Planning a design is part of planning a publication. For a manual or report, it is important to ask such questions as:

- ☐ Who are the intended readers?
- ☐ How and where will the readers use the publication?
- ☐ What response do we want from them?

- ☐ How much information must be communicated?
- ☐ What are the special needs for illustration, if any? and
- ☐ How many copies will be printed?

There are many choices in design, and each choice must be made with the reader in mind. This is a brief review of some aspects of design that affect readability and ease of use.

## Type in titles

Titles help readers find their way through a publication. They announce what is important. They can show how one part of the text relates to other parts. Used properly, titles are a powerful tool.

The *major title* is the title of the manual, report, book, or other publication. This is what the readers see first. It announces the main subject of the publication. The title should be easily readable and attractive.

*Minor titles* are the titles of chapters or sections. They show the basic structure of the publication and guide readers to the parts of greatest potential interest. They must stand out from the rest of the text.

*Headings and subheadings* are lower-level announcements of a new part within the chapter or section. Complex texts may need as many as three levels of heading. Manuscripts with more than three levels of headings should use another method, such as numbers, to distinguish between levels of headings.

## Type for text

The *main text* is the body of the publication. This is where readers will spend most of their time. Special care must be taken to make sure it is easy to read.

*Minor texts* include abstracts, quotations, lists of references or bibliographies, and sometimes appendices. Readers will only refer to these; they will not read them continuously for long periods. Minor texts can be set in slightly smaller type than the major text.

*Subtexts* include footnotes, indexes, copyright notices, and some other publishing information. Readers will refer to this material only briefly and occasionally. An index, for example, will be read only one line, or a few lines, at a time. Subtext can be the same size as or slightly smaller than minor text.

*Paragraph* openings announce that a new idea or set of related thoughts is beginning.

The start of a new paragraph can be shown typographically in two ways. The traditional way is to indent the first line. Another way is to leave a line of space between paragraphs; in that case no indention is needed. Avoid doing both: either indent or leave a line space.

## Type size

The size of type used for each of these functions will depend on several factors:

- ☐ The subject;
- ☐ The readers;
- ☐ The availability of different type sizes and weights; and
- ☐ The size of the publication and the column width.

Here is a range of sizes used frequently to show the relative importance of titles, headings, and text.

| Use within publication | Common sizes (in points) |
|---|---|
| Titles | |
| Major | 30, 36, 42, 48 |
| Minor | 18, 20, 24 |
| Headings | |
| First level | 12, 14, 18 |
| Second level | 10, 12, 14 |
| Third level | text size |
| Text | |
| Major | 9, 10, 11, 12 |
| Minor | 1 or 2 pt less than text |
| Subtext | 2 or 3 pt less than text |

The type used for titles and headings is often not the same as the type used for the text. The use of a different typeface adds to the contrast between the titles and headings and the text. But the distinction should be immediately obvious. The two faces should be clearly different.

## Page format

Titles, headings, text, and illustrations must be combined on pages in a way that is attractive to the eye and convenient for the reader. Here are some guidelines for planning or judging a page layout.

## Margins

Margins are important because they define the amount of the page that will be occupied by type. If margins are too small the text looks very tight and dense. Larger margins (and therefore more white space) give publications a more open feeling and makes them easier to read. However, margins should not be so wide that they waste large amounts of space.

## Balance

The area within the margins is called the type area. The type area includes running heads and page numbers. The page should have a pleasing balance. Balance can be symmetrical or nonsymmetrical.

In *symmetrical designs*, titles are centred horizontally on the page. So are other elements: first-level and maybe second-level headings, running heads, page numbers, and illustrations. If the page is folded in half vertically, one side mirrors the other side.

In *nonsymmetrical designs*, headings and other elements are usually on one side of the page. Balance is achieved with white space and relative weight of type. This non-centred style is easier to use for complex manuals and reports with several levels of heading. The most common form of non-centred style is flush left in which all headings and other elements are on the left-hand side of the page.

## Columns

Publications can be designed with one column on a page or many columns on a page. The choice of number of columns depends on the type of publication.

A publication that is all text, with few or no illustrations or tables, can usually be planned in a simple one-column format. This is the traditional book design. The page size should be about 6 x 9 in. (152 x 228 mm) or A5 or smaller. Otherwise the column will be too wide for easy reading or the margins will be wastefully large.

More complex publications, especially those with many graphs and charts or scientific illustrations, may be better in a two-column layout. This format is flexible: tables and illustrations can be one or two columns wide, depending on their nature, and can usually be placed close to the references to them in the text. The format is also compact and economical. Because the two columns are normally narrower than a standard book width, their type size can be reduced and still be easy to read. As a result, a two-column page can hold more words than a single-column page that is the same size. Most journals adopt a two-column format.

Even if most of a publication is set in one column, sections with many short lines can be set in two or even three columns. An index, for example, is usually set in narrow columns.

## Illustrations

Illustrations should be placed so that they appear close to the references to them in the text.

Many designers suggest that illustrations should appear at the top or bottom of a page, but never in the middle. When illustrations are in the middle, the reader must jump over them to read the text. Some pictures will look better at the top of a page, others will look better at the bottom. Variety in placing them is good.

## Tables

Tables should appear either at the top of the page or at the bottom, but always in the same place. That way the reader can find them easily and read the text without interruption. If two or more tables must appear on a single page, they should be stacked one immediately above the other.

## White space

Space is part of any design. It shows the breaks between sections and sub-sections. It gives emphasis by setting important elements apart from other parts of the text. It makes a page look open and therefore more attractive. A crowded page discourages readers: it looks difficult to read.

Paper is expensive, and space should not be wasted. But space should not be ignored. It should be used as part of effective communication.

Space is part of any system of headings. It is normal to insert space before headings (at least at the first and second levels) to show that one part of the text is complete and another is starting.

Sometimes space is inserted below the heading as well as above it. This isolates the heading and gives it extra emphasis. However, headings must be tied clearly to the text they refer to. For this reason, the space above the heading is normally larger than the space below it.

## Page numbers

Numbers can be at the top or bottom of the page. If the design uses a centered layout, they may be centered. Otherwise they

should be at the outer edge of the type area, where the reader can find them easily. Page numbers are often omitted on the title page and on the first page of the table of contents, the first page of chapters, and other opening pages; alternatively, they may be put at the bottom of those pages.

## Running heads

Running heads are short single lines at the top of the page to help readers know exactly where they are in the publication. Sometimes these lines are at the bottom of the page, in which case they are called running feet.

The page number may appear on the same line as the running head. They are usually flush left on left-hand pages and flush right on right-hand pages, preferably with the page number on the outside. They should be typographically different from the text so that the reader can identify them easily. Running heads are omitted on pages that do not have page numbers.

## Models

Design should relate to function. Most of these suggestions for design are intended to help the reader. But design is also a matter of opinion and custom. Not everyone may agree with these suggestions. Furthermore, design involves dozens of separate decisions. Only a few have been covered here.

Study the design of other publications. Learn from them. Analyze them and identify what you like or what you think works well. Adapt things you like to your own needs and the resources available to you. As well, review the suggestions made in such publications as *Looking Good in Print: A Guide to Basic Design for Desktop Publishing* and *One Minute Designer.*

## Exercise 14

Review the examples on the next four pages to see how design and layout have been used. How have the elements in these examples helped or hindered the reader?

Record your ideas and comments here.

# FOREIGN AID, The Do-It-Yourself Way

*Ethiopian researcher in sorghum grain project*

In 800 projects around the globe, a little-known Canadian agency is helping the world's poorest people make life better for themselves

BY DAVID SPURGEON

USING a hormone from Canadian salmon, Philippines scientists in 1977 found a way to breed milkfish in captivity. It was a breakthrough that could revolutionize milkfish farming and dramatically improve the diet of millions of Asians, for whom milkfish are the prime source of protein.

• Ethiopian researchers in 1978 identified two strains of sorghum that may yield up to eight times as much as other types of this crop, whose grain is a staple food for the 400 million people who live in the world's semiarid tropics.

• The Malaysian Handicraft Board had a problem — how to speed up the splitting of bamboo trunks — until a newly trained technician designed a mechanical knife with eight blades. It increased production fourfold.

Behind each of these success stories is a Canadian public corporation with an unwieldy name — International Development Research Cen-

DAVID SPURGEON, who spent seven years with the International Development Research Centre, writes from Nairobi where he now is senior science writer with the International Council for Research in Agroforestry.

PHOTOS: NEIL McKEE, IDRC

# 1. Plain Language and the Public Servant

As a public servant, you are probably more aware than most people that we are living in an information age. In fact, you may sometimes feel overwhelmed by memos, letters, directives, manuals, brochures, reports and policy papers.

In your work, you may also have to write many documents. And the words you write may reach beyond the public service to Canadians across the country and abroad.

People with a wide range of reading abilities should be able to understand written messages from public servants and government departments. All Canadians are affected by government regulations and programs in many different but important ways. Whether they need to know about conservation, tax matters or radon gas levels in their homes, and whether they are excellent readers or not, Canadians have a right to receive clear information from the federal government.

Like other Canadians, public servants are sometimes subjected to writing that is filled with official-sounding jargon, or bureaucratese. You may feel frustrated by information that affects your work that is written in ways only an expert on the subject can understand.

be expressed in reciprocal megakelvins ($MK^{-1}$). Prefixes are not used with the reciprocal degree Celsius because of the difficulties encountered in writing such unit names and symbols. When required, values in reciprocal degrees Celsius may be expressed in the form $y \times 10^{-x}/°C$. For example, $12 \times 10^{-6}/°C$ and $12\ MK^{-1}$ convey the same information.

## 5.19 Heat Transfer

### 5.19.1

Thermal conductivity (or k-value) is a measure of the heat energy flow through a material and is expressed in watts per metre degree Celsius (W/(m·°C)). Thermal resistivity is the reciprocal of thermal conductivity (1/k) and is given in metre degree Celsius per watt (m·°C/W).

### 5.19.2

The thermal conductance of a material, also known as its coefficient of heat transfer or U-value, is the material's thermal conductivity for a given thickness; it is therefore expressed in watt per square metre degree Celsius ($W/(m^2 \cdot °C)$). Thermal conductance values of a stack of materials (eg, when heat passes through a number of materials in series) are not additive; only their reciprocals are. The reciprocal is the materials' thermal insulance, and is known as the R-value. Thermal insulance (previously known also as thermal resistance) is expressed in square metre degree Celsius per watt ($m^2 \cdot °C/W$).

### 5.19.3

Thermal transmittance is expressed in the same units as conductance: watt per square metre degree Celsius ($W/(m^2 \cdot °C)$). Thermal conductance is calculated between surfaces, whereas thermal transmittance is calculated from air to air, ie, it includes surface or film conductances.

### 5.19.4

In electronics, the thermal resistance of a specific configuration, eg, the thermal resistance of a transistor junction to case, is usually expressed in degree Celsius per watt (°C/W).

## 5.20 Heat Capacity

### 5.20.1

The joule per kelvin (J/K) and the joule per degree Celsius (J/°C) are the SI units of heat capacity and of entropy.

### 5.20.2

The joule per kilogram kelvin (J/(kg·K)) and the joule per kilogram degree Celsius (J/(kg·°C)) are the SI units of specific heat capacity and of specific entropy. The specific heat capacity of water is expressed in kilojoules per kilogram kelvin (kJ/(kg·K)).

## 5.21 Specific Enthalpy

The joule per kilogram (J/kg) is the SI unit of specific enthalpy. The change in specific enthalpy associated with a change of state at constant temperature was previously known as latent heat or heat of fusion.

## 5.22 Electric Charge

The coulomb (C) is the SI unit of electric charge. The charge of a battery is often expressed in ampere hours (A·h). This should eventually be abandoned in favour of the kilocoulomb (kC).

## 5.23 Electric Resistance, Reactance, and Impedance

The ohm (Ω) is the SI unit of resistance, reactance, and impedance. For these quantities, the range of numerical values in ohms is very wide and therefore a whole range of prefixes is commonly used, depending on the circumstance, from microohm for shunt wire to megohm, gigaohm, or even teraohm for insulation.

## 5.24 Electric Conductance, Susceptance, and Admittance

The siemens (S) is the SI unit of conductance, susceptance, and admittance. As in the case of ohms, several prefixes are commonly used, ranging from microsiemens for insulators to megasiemens for conductors.

## 5.25 Level Difference

### 5.25.1

The power ratio of a given power $P$ and an arbitrary reference power $P_0$ is given by

power ratio $= P/P_0$

The amplitude ratio of a given field $F$ and an arbitrary reference field $F_0$ is given by

amplitude or field ratio $= F/F_0$

In electrotechnology, the field is usually a voltage or current; in acoustics, it is usually a pressure.

Power ratios and field ratios are dimensionless quantities.


Peanuts
YOU PROBABLY SHOULD START A NEW PARAGRAPH HERE, AND THEN MAYBE CAPITALIZE THIS WORD...
WHAT ELSE WOULD YOU LIKE TO KNOW?
SHOW ME WHERE YOU SPRINKLE IN THE LITTLE CURVY MARKS...
COMMAS
WHATEVER

# Resource Materials

*These books have been purchased for the project. They provide much more detail on writing, editing, layout and design, and publishing.*

Day, Robert A. Scientific English: A Guide for Scientists and Other Professionals. 1992. The Oryx Press, 4041 North Central Ave., Suite 700, Phoenix, AZ 85012, 136 pp.

Day, Robert A. How to Write and Publish a Scientific Paper, 4th edition. 1994. The Oryx Press, 4041 North Central Ave., Suite 700, Phoenix, AZ 85012, 223 pp.

Haydon, Leslie M. 1995. The Complete Guide to Writing and Producing Technical Manuals. John Wiley and Sons Inc., 605 Third Avenue, New York, NY, 10158-0012, 294 pp.

International Development Research Centre. 1993. Style Guide for Editors and Proofreaders of IDRC Books. International Development Research Centre, P.O. Box 8500, Ottawa, ON, K1G 3H9, 90 pp.

Parker, Roger C. 1993. Looking Good in Print: A Guide to Basic Design for Desktop Publishing. Ventura Press Inc., P.O. Box 2468, Chapel Hill, NC 27515, 423 pp.

Parker, Roger C. 1993. One Minute Designer. Que Corporation, 201 W. 103rd Street, Indianapolis, IN 46290, 288 pp.

Smith, Datus C Jr., A Guide to Book Publishing, revised edition. 1988. University of Washington Press, PO Box 50096, Seattle, WA 98145-5096, 282 p.

Society for Technical Communication. 1987. Basic Technical Communication. Suite 904, 901 N Stuart Street, Arlington, VA 22203, 118 pp.

Society for Technical Communication. 1994. Technical Editing: Basic Theory and Practice. Suite 904, 901 N Stuart Street, Arlington, VA 22203, 140 pp.

Strunk, William Jr and E.B. White. Elements of Style, 3rd edition. 1978. Macmillian Publishing Company, 866 Third Ave., New York, NY 10022, 92 pp.

University of Chicago Press. 1982. The Chicago Manual of Style. University of Chicago Press, 1225 East 60th St., Chicago IL 60637, 738 pp.

University of Chicago Press. 1987. Chicago Guide to Preparing Electronic Manuscripts. University of Chicago Press, 1225 East 60th St., Chicago IL 60637, 154 pp.